



Los Alamos National Laboratory

Unattended and Remote Monitoring Systems

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Unattended and Remote Monitoring (UNARM) Systems—Leading the Way in 21st Century Nuclear Materials Control.

The International Atomic Energy Agency (IAEA) faces an increasingly large task in assuring that nuclear materials are not diverted to nonpeaceful purposes. It is both costly and difficult to maintain the number of inspectors needed to monitor and check every nuclear facility throughout the world. With more countries coming under IAEA safeguards, and Russia and the United States volunteering excess material to be monitored, the demand for nuclear inspections and monitoring is increasing every day. Therefore the IAEA has recommended greater use of advanced technologies, including equipment capable of operating in an unattended mode and remote transmission of safeguards data, to safeguard nuclear materials from rogue or terrorist use.

Los Alamos National Laboratory is working with the IAEA, the Japan Nuclear Cycle Development Institute (JNC), the Japan Nuclear Material Control Center (NMCC), and the Japan Nuclear Fuel, LTD (JNFL) to develop and install unattended and remote monitoring (UNARM) systems in various nuclear facilities in Japan. Under the umbrella of the Department of Energy (DOE)-JNC collaboration agreement, ten facilities have had UNARM systems installed. Some of these systems have

been in continuous operation for more than ten years without any loss of data. In the item-accounting facilities (nuclear reactors), UNARM systems monitor the movement of fresh fuel from storage to reactor and the discharge of spent fuel into storage pools. Examples of item-accounting facilities where UNARM systems have been installed in Japan include the FUGEN reactor, the MONJU reactor, the JOYO reactor, and the High-Temperature Engineering Test Reactor at O-arai.

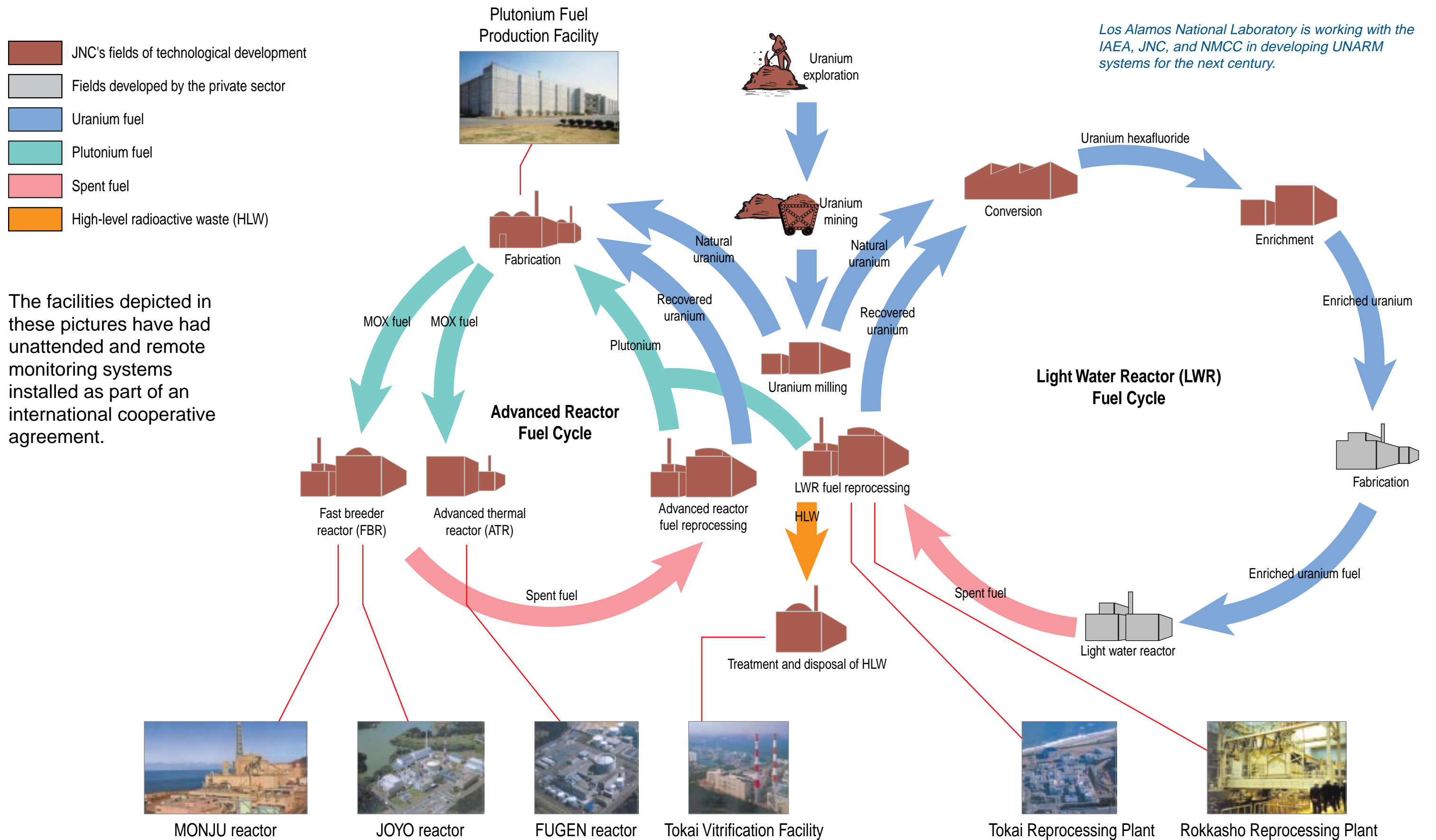
Over the years, Los Alamos has extended UNARM technology to bulk-handling facilities, such as the Plutonium Fuel Production Facility (PFPF) and the

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UNARM systems at the Tokai Reprocessing Plant continuously monitor the plutonium content of leached hulls.





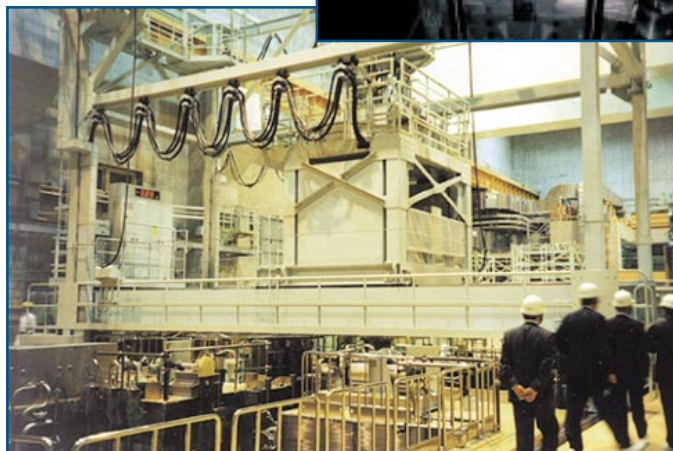
Tokai and Rokkasho Reprocessing Plants. In bulk-handling facilities the nuclear materials do not stay as items but are combined or divided into several parts. UNARM sensors in these facilities determine the nuclear material going into the plant, the processing of the material, and the output of the plant, even as the nuclear material is combined or divided into several forms. The UNARM sensors all operate unattended for an extended period of time. In the PFPF facility, the UNARM systems have saved inspection efforts by a factor of five or more.



At the end of the fuel cycle, an UNARM system's vitrified waste coincidence counter monitors the plutonium content in vitrified glass.



UNARM systems are installed at Rokkasho spent-fuel pond to monitor the movement of spent fuel. The UNARM system can tell spent-fuel type and direction of motion and provide a visual record (video tape) of the fuel being monitored.



All these systems are based on 30 years of experience in developing sensors and assay equipment to determine the fissile content of nuclear materials. In the last ten years, we have developed sensors to determine the fissile content in radioactive samples such as spent-reactor fuel elements. Our UNARM systems determine plutonium mass in spent-fuel assemblies, leached hulls, and vitrified nuclear waste. With these new capabilities, we now possess methods to provide containment and surveillance of nuclear materials throughout the power-reactor fuel cycle. These capabilities complement our other UNARM installations in the fuel fabrication portion of the cycle. ■

For more information, contact the Safeguards Science and Technology Group (NIS-5) office at (505) 667-7110

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